



# Perspectives on U.S. Nuclear Energy Policy

Craig Piercy, ANS Washington Representative

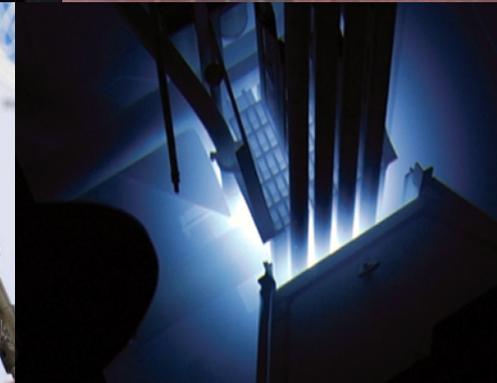
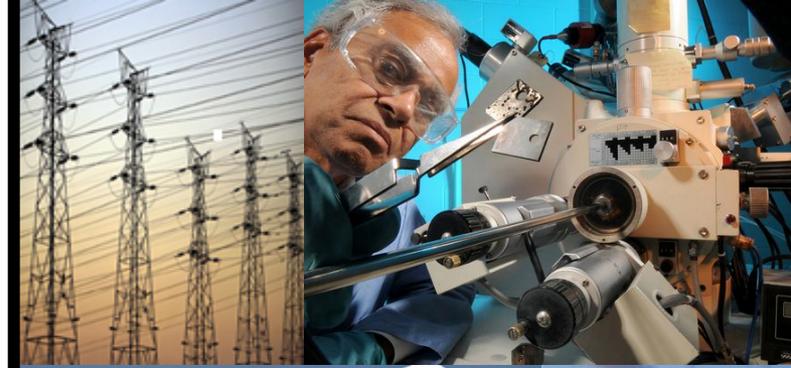
Virginia Nuclear Energy Consortium Authority

May 20, 2015

Richmond, VA

# American Nuclear Society

- 11,000 men and women
- Local sections across the US and in Europe, Asia and Latin America
- Industry, government, national labs, academia
- Focused on nuclear engineering and related disciplines
- **The central professional organization of the US nuclear community**
- **ANS.ORG/JOIN**



# Does the US really have a “national nuclear policy?”



## Federal responsibilities...

- Waste Management (DOE)
- Safety and security regulation (NRC)
- Research & Development (DOE)
- Insurance (Price-Anderson)
- “All-of-the-above” (Loan guarantees, production tax incentives)
- Export promotion (Commerce/Ex-Im bank)
- Export Control (123 and 810)
- Regional economic development (TVA)
- Regulation of CO<sub>2</sub> as a pollutant (EPA)

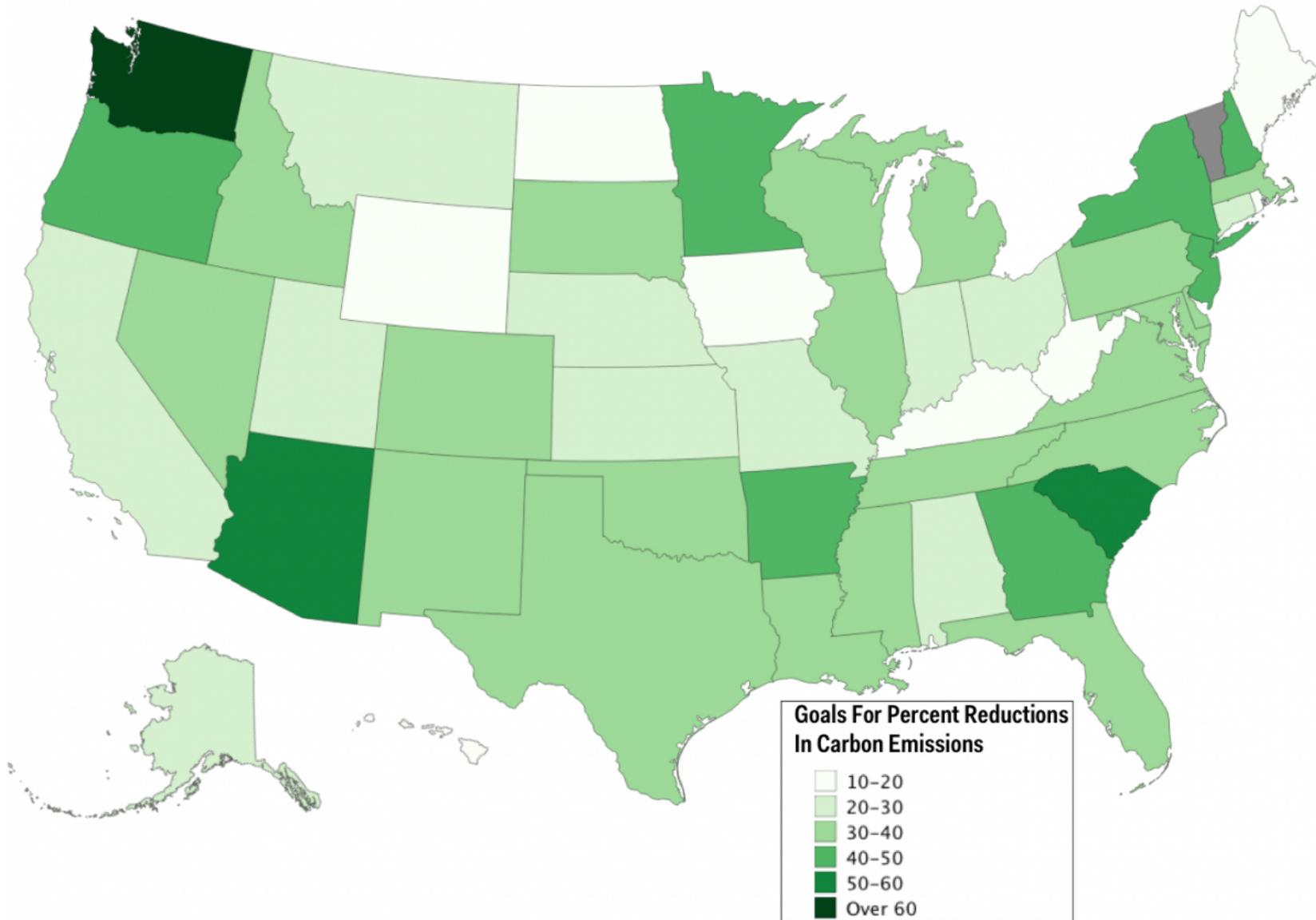
## What the feds don't do...

- Provide “sovereign commitment” for nuclear
- Define generation mix
- Provide direct subsidies/ strike prices

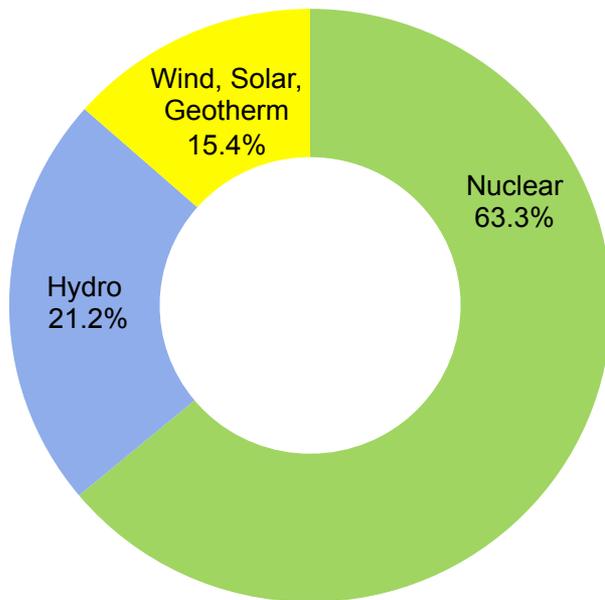
# EPA Clean Power Plan



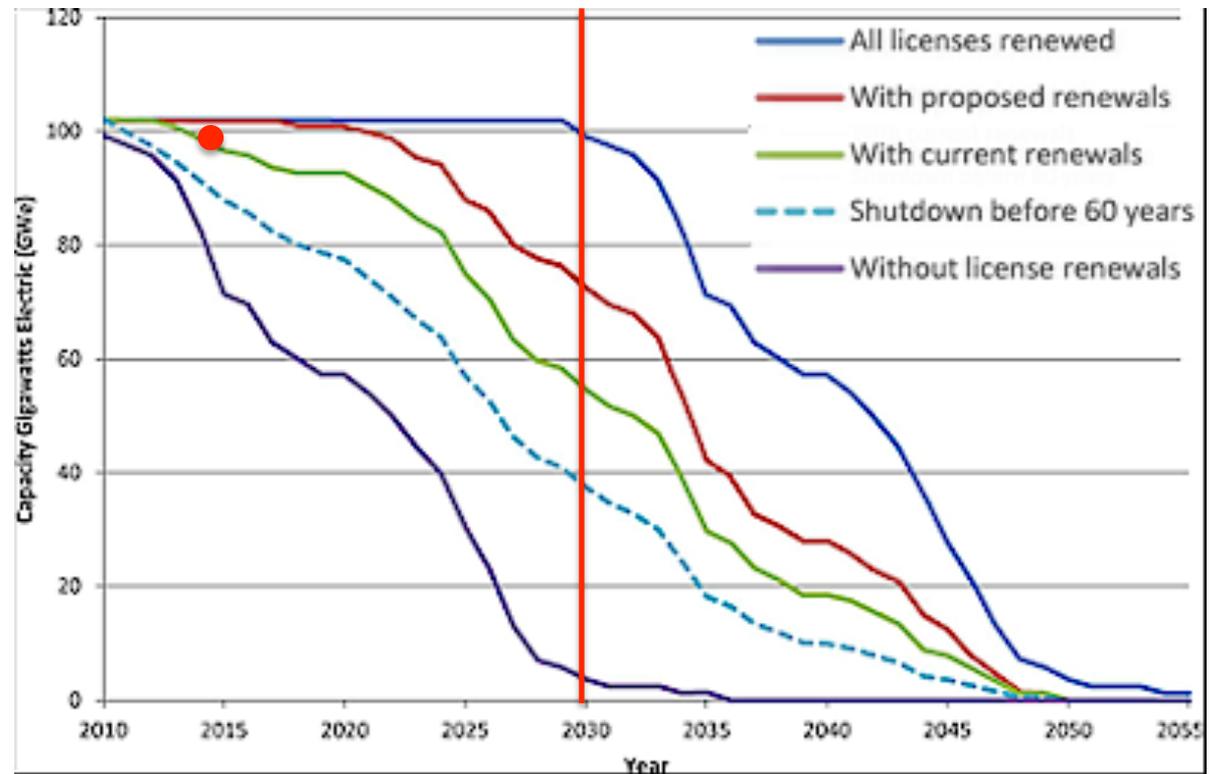
# ANS



# Clean energy contributions of the current U.S. nuclear fleet



2013



# EPA Clean Power Draft Rule



- States given individualized “performance” targets based on baseline emission rate, minus four “building blocks”:
  1. Heat rate improvement
  2. Coal-to-gas redispatch
  3. Renewable and nuclear generation (at-risk and new)
  4. End-use energy efficiency
- States with NPPs given credit for 5.8% of “at risk” existing nuclear capacity.
- Under the rule, if all U.S. nuclear plants were shut down and replaced with NGCC, 15 states would “lower” their emission rates.

# The ANS “ask”



1. Treat existing nuclear plants equally with other non-emitting energy sources
  - ANS recommendation: amend Best System of Emission Reduction (BSER) baseline rate determination formula to include 100 percent of each state’s existing nuclear generation.
  
2. Acknowledge and reward states with new nuclear plants under construction.
  - ANS recommendation: remove new U.S. nuclear plants under construction from the BSER formula and allow states to count the avoided emissions toward their compliance plans once they are operational.



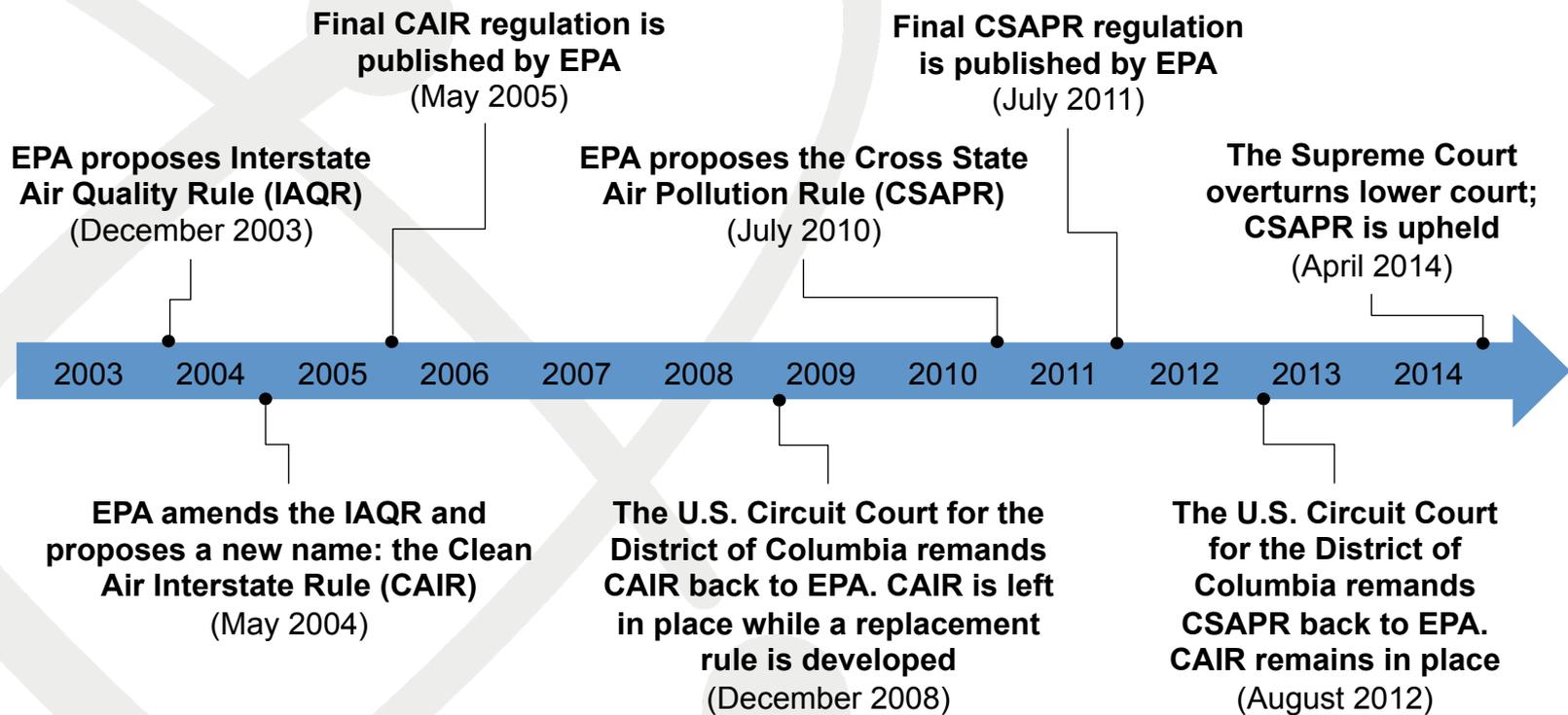
“People did not appreciate the way we handled it ... so we’re relooking at it on the basis of the comments that came in”

Administrator Gina McCarthy  
Hearing, House Energy and Commerce Committee  
Feb 25, 2015

# The Cross State Air Pollution Rule's Long History



Because of legal challenges, the process to complete power-sector sulfur dioxide and nitrogen oxide regulations took more than a decade





# Illinois:



## Low Carbon Portfolio Standard

- Requires electric utilities to obtain low carbon energy credits for 70% of the electricity used on the distribution system.
- Sunsets on the later of December 31, 2021, or the effective date of the implementation of Illinois' adoption of a market-based program to reduce carbon emissions pursuant to Section 111(d) of the federal Clean Air Act.
- price cap - 2.015% annual increase over 2009 retail prices, or about \$2 per month for the average Illinois residential electricity customer (less than would occur if some of Illinois' nuclear plants were to close early)

# New Nuclear in the States

## Regulatory Structure of the Electricity Market



Regulatory Construct	# of States	# of active NRC apps	# under const.
<b>Restrictions on Nuclear Power Plant Construction:</b> CA, CT, HI, IL, KS, KY, ME, MA, MN, MT, NJ, OR, RI, VT, WV, WI,	16	-	-
<b>Rate-of-Return Regulated with AFUDC:</b> AK, IA, MO, ND, SD, WY	6	-	-
<b>Rate-of-Return Regulated with CWIP:</b> AL, AZ, AR, CO, FL, GA, ID, IN, LA, MS, NE, NV, NM, NC, OK, SC, TN, UT, VA, WA	20	12	5
<b>Deregulated:</b> DE, MI, NH, NY, MD, OH, PA, TX	8	5	-
<b>TOTALS</b>	50	17	5

# ANS Special Committee on Nuclear and the States



- Formation Summer 2015
- Member Experience: utilities, vendors, PUCs, RTOs, state legislative
- Acknowledge importance of current fleet, focus on new nuclear development in US
- Review regional economic factors, 111d targets, generation mix, power grid structure and market mechanisms
- Study current new build efforts, enumerate lessons learned
- Identify state/regional-level barriers to new nuclear construction; outline possible solutions

# Nuclear fuel cycle policy

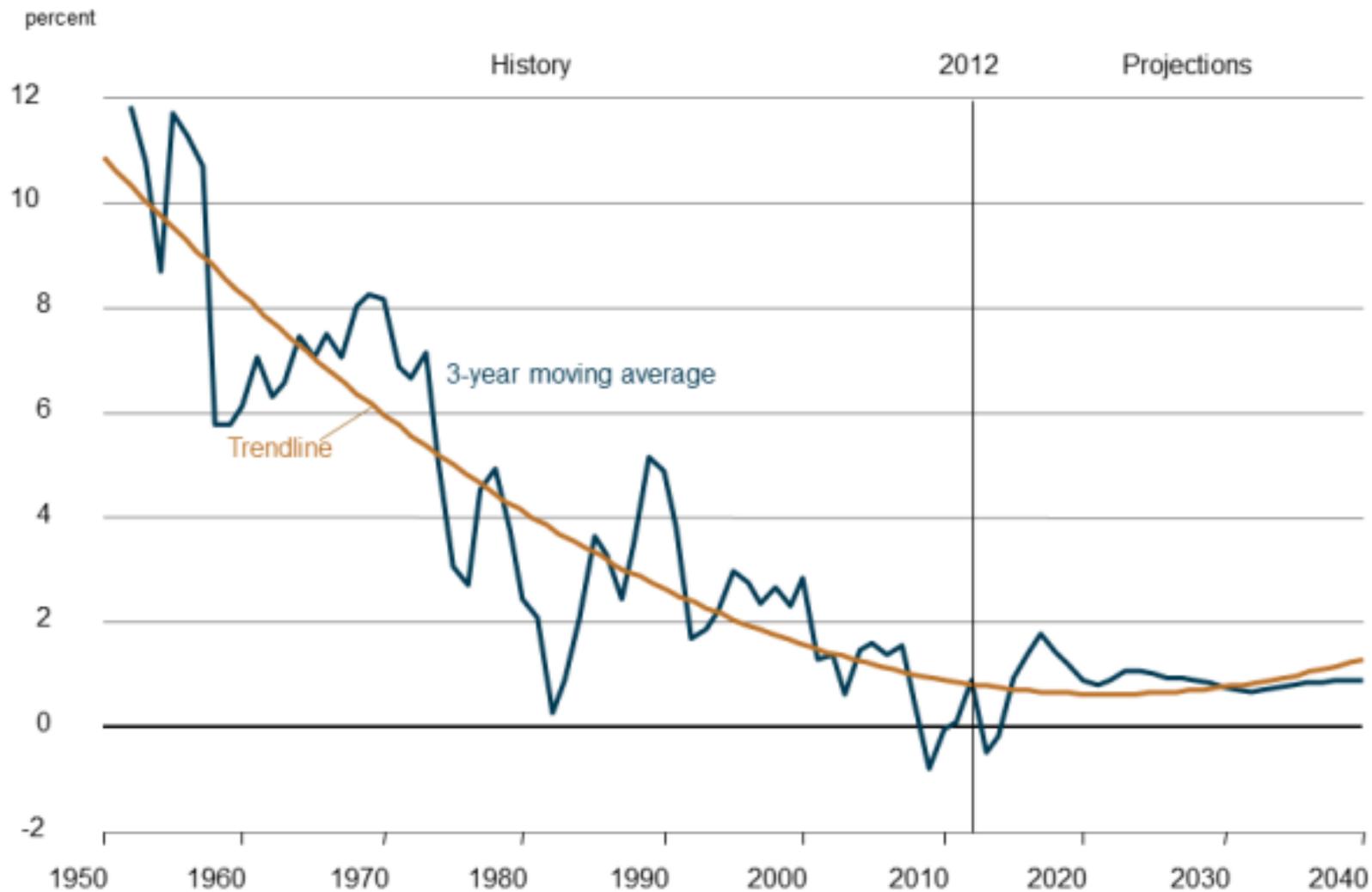


- Yucca Mountain
- Interim Storage
- Administration’s “Decommingling” decision
- Nuclear Waste Administration Act

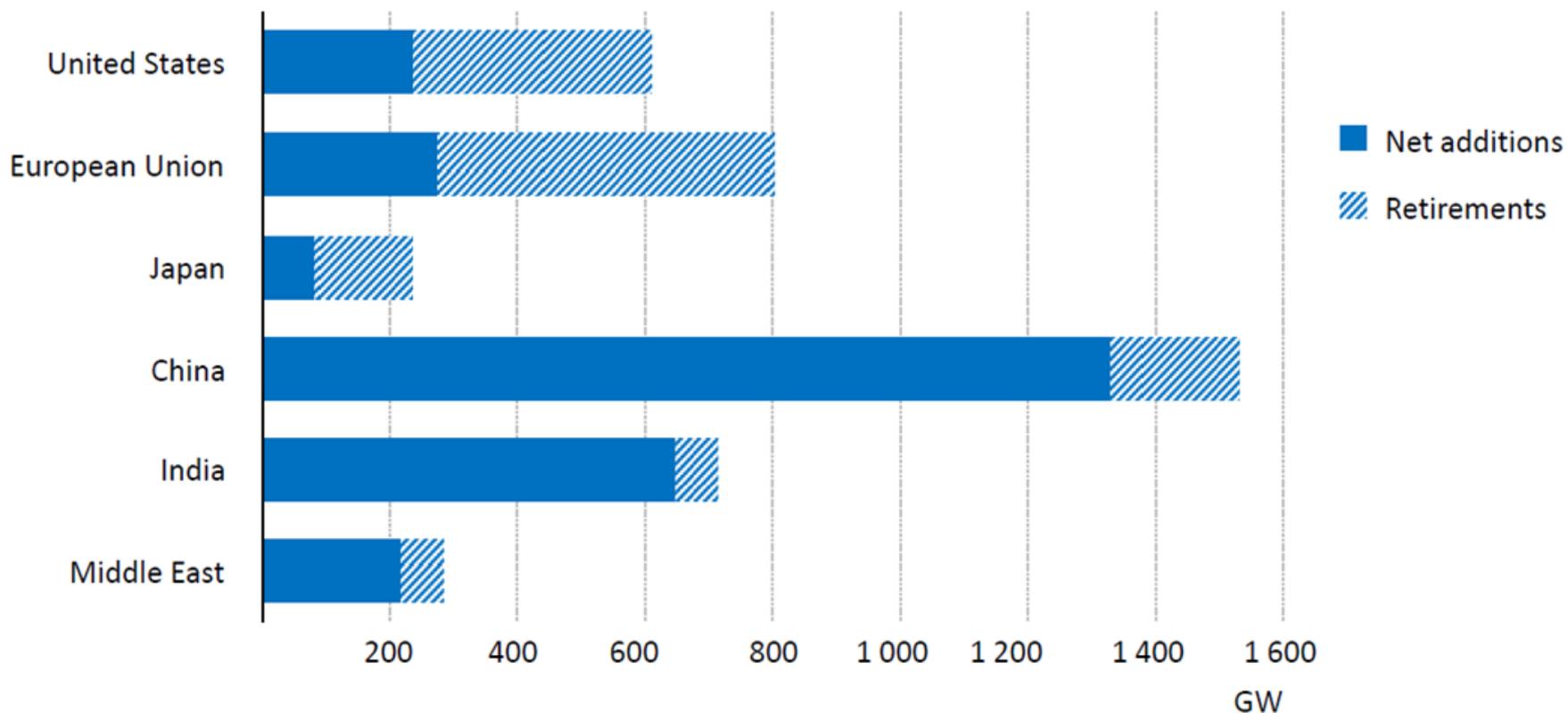
# U.S. Waste Repository Scenarios

Nuclear Futures	Legal Limit	Extended Licensing	Constant Energy Generation	Constant Market Share	Growing Market Share
<b>Total used fuel by 2100 (MTHM)</b>	63,000	120,000	240,000	600,000	1,300,000
<b><u>Number of Geologic Repositories</u></b>					
<b>Current Approach</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>9</b>	<b>21</b>
<b>Expanded Capacity</b>	<b>1</b>		<b>2</b>	<b>5</b>	<b>11</b>
<b>MOX Recycle</b>	<b>1</b>			<b>2</b>	<b>5</b>
<b>Continuous Recycle</b>	<b>1</b>				

# US Electricity Demand Growth



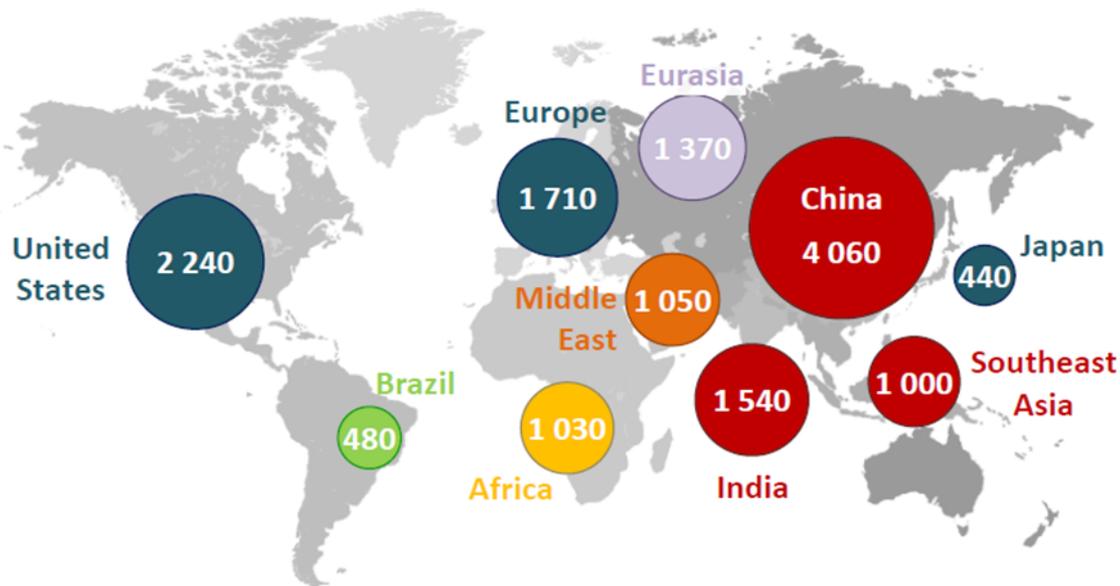
## Power generation capacity additions and retirements, 2013-2035



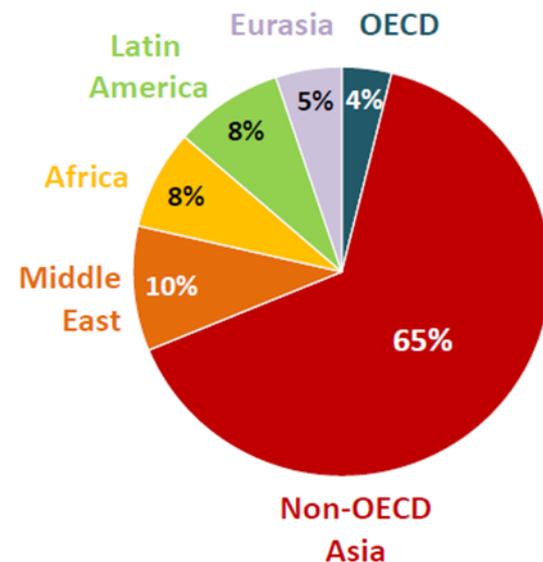
***China & India together build almost 40% of the world's new capacity;  
60% of capacity additions in the OECD replace retired plants***

Source: IEA 2013

## Primary energy demand, 2035 (Mtoe)



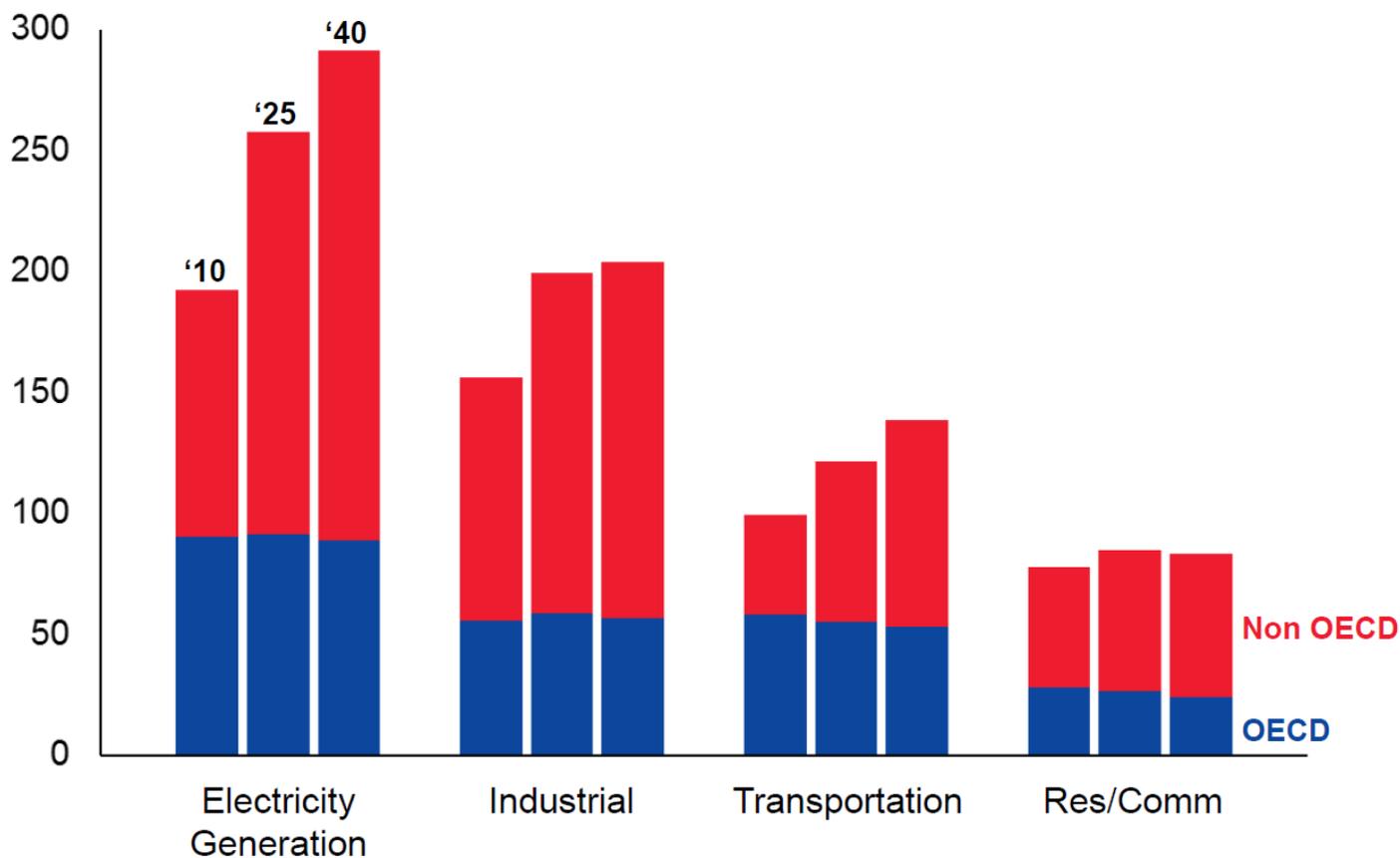
## Share of global growth 2012-2035



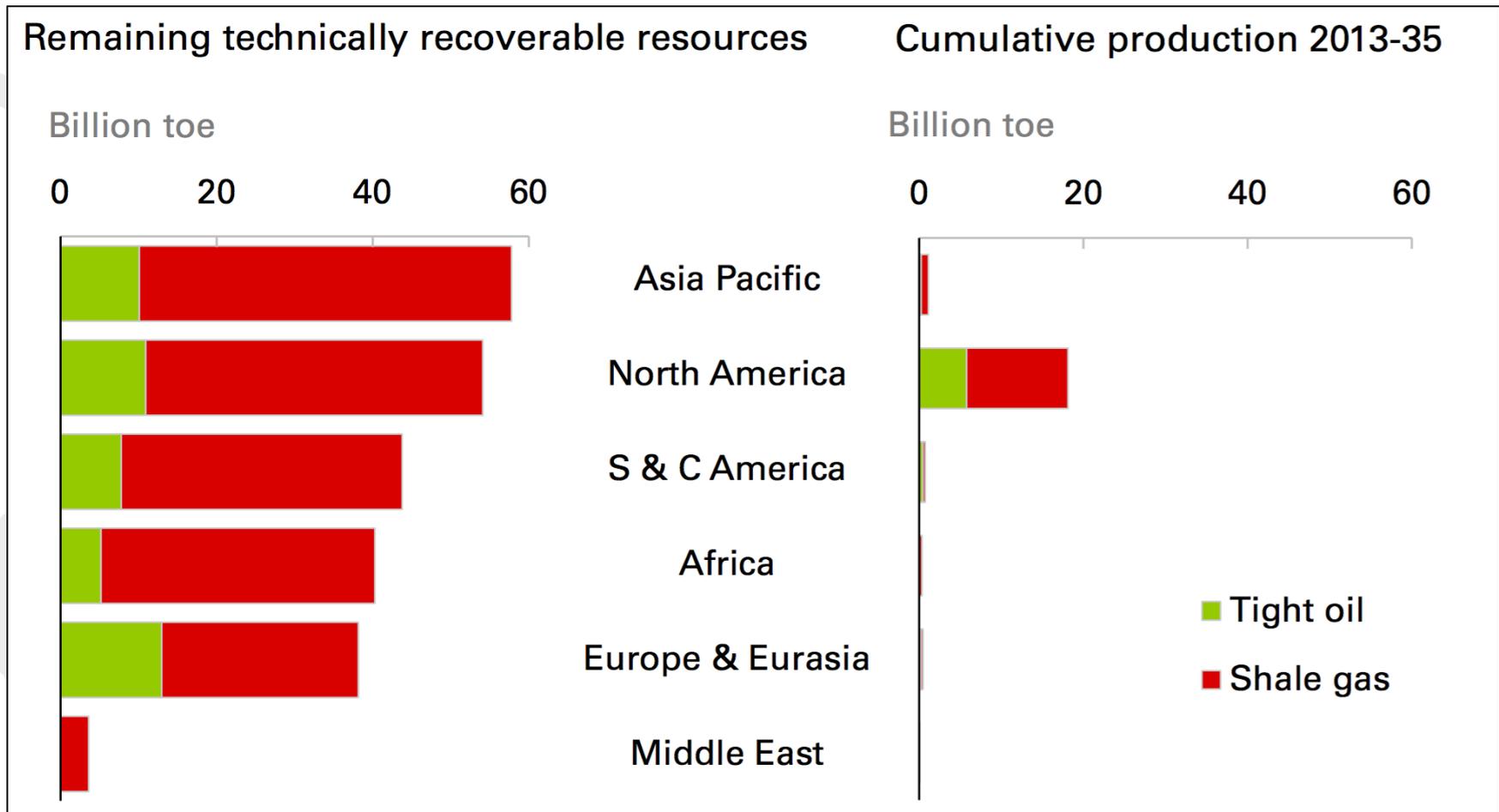
*China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth*

### Primary Energy Demand by Sector

Quadrillion BTUs



# Global Shale Gas and Tight Oil



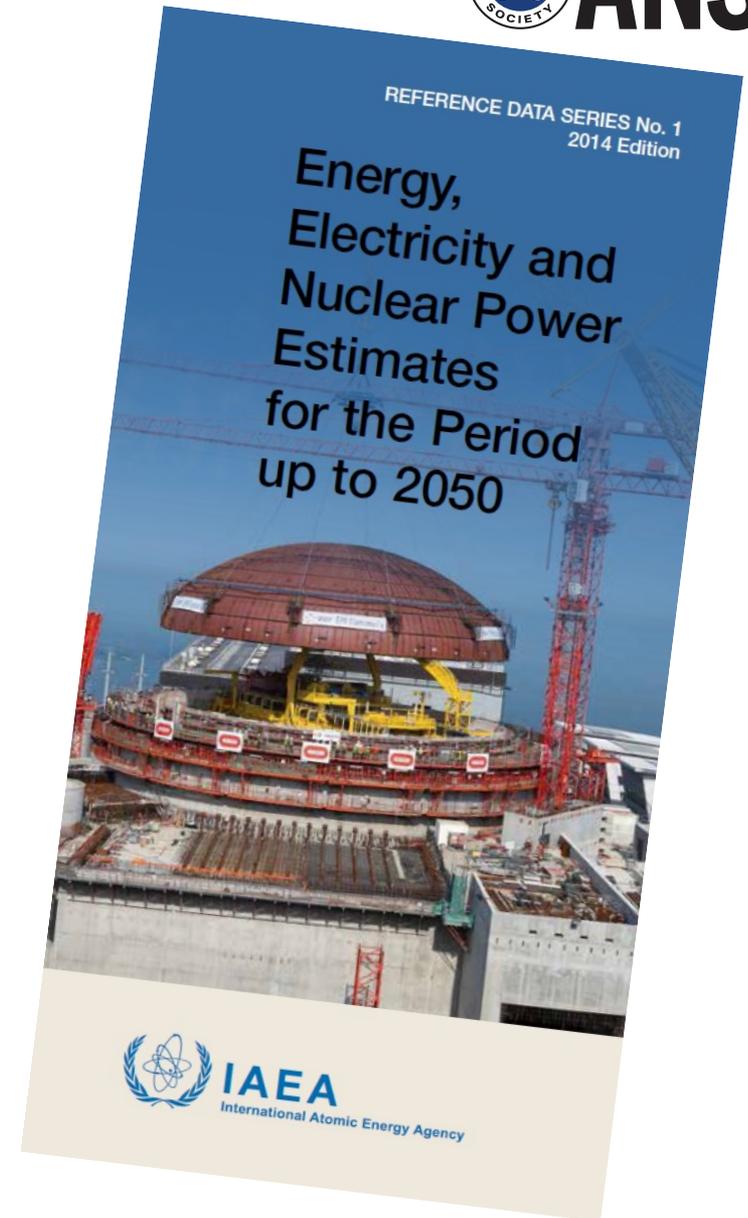
Source: OECD/IEA 2014

# International Nuclear Energy Growth

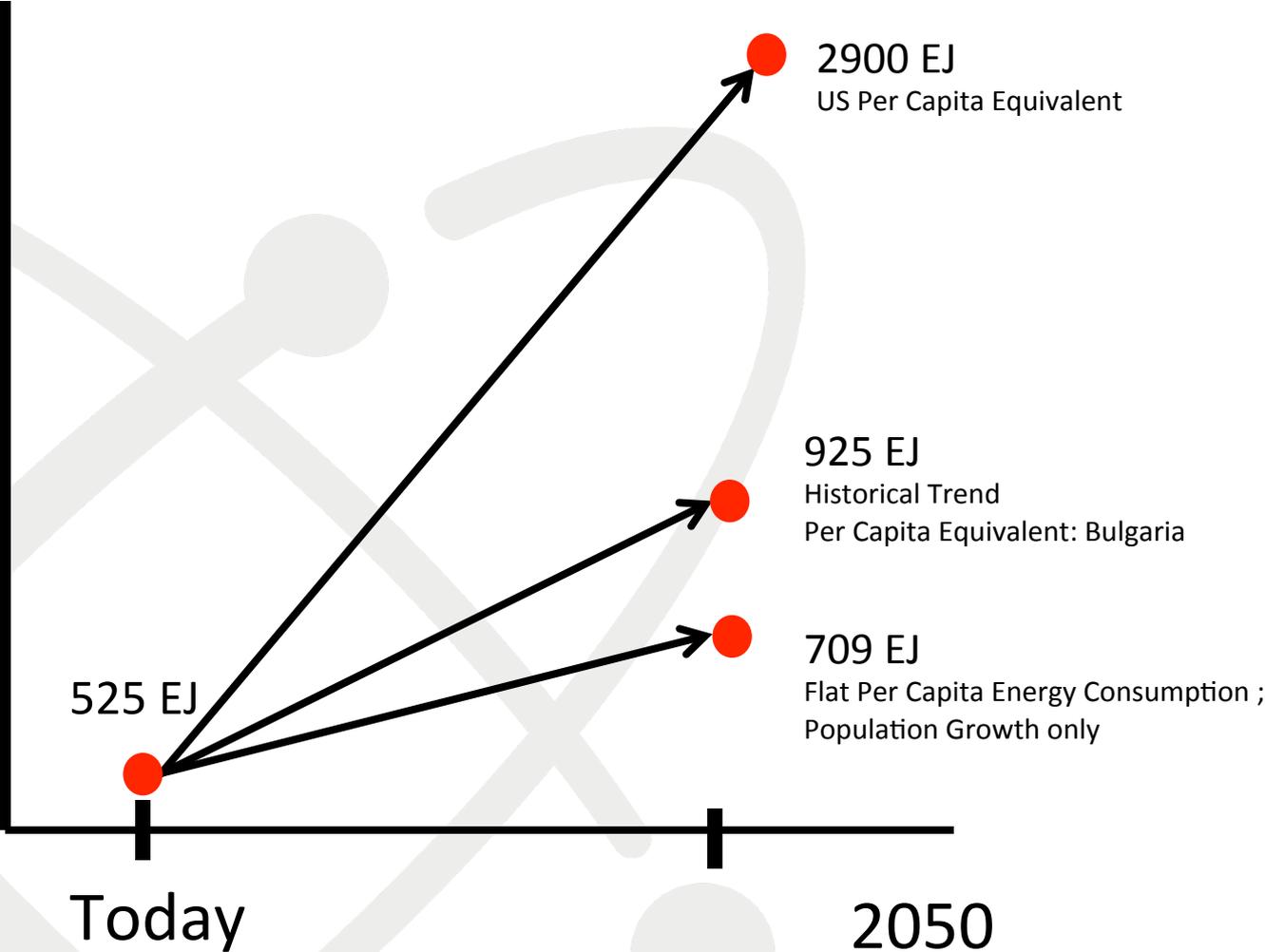


According to the International Atomic Energy Agency (IAEA) :

- “Low Case” nuclear power capacity is expected to expand **41** GW(e) by 2050
- “High Case” increase **720** GW(e) by 2050



# World Primary Energy Use



400 EJ  $\longrightarrow$  9% NUCLEAR = 36 EJ

36 EJ = 10,000 TWh = 1.42 TW

Installed capacity,  
assuming 80% capacity  
factor

1,420 1GW NPPs

50% SMR

710 1GW NPPs + 5680 125 MW SMRs

*\*less than 9,000 work days between now and 2050*



American Nuclear Society

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